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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE



| PRE-APPEAL BRIEF REQUEST FOR REVIEW | Docket Number (Optional) H0004210.35477 |
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I hereby certify that this correspondence is being transmitted by facsimile on the date shown below to the United States Patent and Trademark Office at (571) 273-8300.

Signature _____
S. Jared Pitts
Date 26 Sept 2006

| In re Application of | Jack H. JACOBS et al. | |
|---|---|---|
| Application Number 10/608,174 | | Filed June 26, 2003 |
| For: PIEZODYNAMIC VIBRATION DAMPING SYSTEM | | |
| Group Art Unit 3682 | | Examiner V. Luong |

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).

Note: No more than five (5) pages may be provided.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.37(b) is enclosed (Form PTO/SB/96)

☒ attorney or agent of record. Registration number 38,579

☐ attorney or agent acting under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____

Signature _____
S. Jared Pitts
(480) 385-5060
Date 26 Sept 2006

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☒ Total of 1 forms are submitted.

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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|---|---|---|---|
| In re application of: | Jack H. Jacobs | Group Art Unit: | 3682 |
| Serial No.: | 10/608,174 | Examiner: | Luong, Vinh |
| Filed: | June 26, 2003 | Confirmation No.: | 8229 |

For: PIEZODYNAMIC VIBRATION DAMPING SYSTEM

Docket No.: H0004210A

Customer No. : 000128

## ARGUMENTS ACCOMPANYING PRE-APPEAL BRIEF REQUEST FOR REVIEW

### I. Status of Claims

Claims 1-21 are pending in this application, with Claims 1, 14 and 18 being independent claims. There are no un-entered amendments. In general, the claimed invention is directed toward vibration damping device and method for momentum control devices such as control moment gyroscopes and reaction wheels. The vibration damping device includes a piezodynamic damping spacer and a tuning system, where the piezodynamic damping spacer is configured such that it absorbs vibrations in the momentum control device. The piezodynamic damping spacer converts these vibrations to electrical energy, where they can be dissipated by the tuning system. The tuning system provides the ability to tune the vibration damping device to more effectively absorb vibrations in specific frequency ranges. Thus, vibrations in the momentum control device are effectively reduced.

### II. Rejections under 35 U.S.C. § 102 based on Perni

Claims 1-5, 7, 8 were rejected under 35 U.S.C. § 102(b) as being anticipated by Perni et al (E.P. Patent No. 1,134,443), hereinafter "Perni"). Regarding claim 1, the Examiner stated that Perni teaches a damping spacer 22, a the spacer 22 coupled to bearings, in a momentum control device 2, the damping spacer 22 configured such that vibrations in the bearing 10 are absorbed by the piezodynamic damping spacer 22 and converted to electrical energy. The Examiner further stated that Perni disclosed a tuning system electrically coupled to the damping spacer, the tuning system providing selective control of a resonant frequency

of the vibration damping device such that the vibration damping device absorbs vibrations in a selected frequency range.

In a previous response to this rejection, applicants argued that Perni failed to disclose a piezodynamic damping spacer coupled to a bearing in a "momentum control device", "control moment gyroscope", or "reaction wheel" as the terms are used in the specification and claims. Applicants' specification defines "momentum control devices" as devices used to **controllably impart torque.** They are commonly used on space vehicles for attitude control. The specification describes two specific types of momentum control devices, **reaction wheels** and **control moment gyroscopes.** See paragraphs 0002 –0004 of applicants' specification. See also claims 7 and 8, which specifically recite reaction wheels and control moment gyroscopes. Applicants note that both reaction wheels and control moment gyroscopes are known control devices. See http://en.wikipedia.org/wiki/Control_Moment_Gyroscope and http://en.wikipedia.org/wiki/Reaction_wheels for background information on reaction wheels and control moment gyroscopes.

In the final office action, the Examiner rejected these arguments. In maintaining this rejection, the Examiner stated that a rigid body is subjected to angular momentum when it rotates about its axis. The Examiner then stated that since Perni's device is for measuring and adjusting preload on bearings, and since it is inherently subjected to angular momentum, that it "reads on" the claimed "momentum device".

Applicants respectfully disagree, and again submit that Perni fails to teach a "momentum control device" as claimed, and thus fails to meet all the claimed limitations. First, applicants note that the Examiner specifically cites element 2 of FIG. 1 in Perni as being a momentum control device. Applicants disagree, and note that element 2 of Perni is described as an "actuator device". Furthermore, applicants note that element 2 is not described as "rotating" in any way that could create angular momentum. Finally, applicants submit even if element 2 was rotated, it would not qualify as a momentum control device as the term is defined and used in the specification.

In supporting this rejection the Examiner appears to rely on the theory that since any device device (i.e., element 2 of Perni) is subjected to angular momentum when it rotates about an axis, then element 2 of Perni is a momentum control device. Applicants again

disagree. First, applicants note that a momentum control device is not just "**subjected to** angular momentum" as alleged by the Examiner. Instead, momentum control devices **controllably impart** torque to a vehicle. See applicants' specification at paragraphs 0002-0004. Thus, just because a device could be rotated to generate angular momentum it cannot be considered to be a "momentum control device" because by itself **it cannot controllably impart momentum**. For example, there is no explanation in Perni of how any rotor could be controllably rotated to provide a desired amount of torque on a vehicle.

Furthermore, **even if** the Examiner were correct that any rotating device could be considered a "momentum control device", it could not be similarly said that any rotating device is a **reaction wheel** or a **control moment gyroscope**, the two specific types of momentum control devices recited in the claims 7 and 8. With regard to these claims, the final rejection states: "Regarding claim 7, the momentum control device 2 comprises a reaction wheel 2 (Fig. 1)." And "Regarding claim 8, the momentum control device 2 comprises a control moment gyroscope 2". **Besides being contradictory, these statements are completely without support in the Perni reference**. In fact, the Perni reference does not even contain the words "wheel" or "gyroscope". Thus, there is no teaching in Perni of any "momentum control device" in general, or "reaction wheel" or "control moment gyroscope" in the specific. Thus, applicants submit that the Examiner must withdraw the rejections to claims 7 and 8 based on the Perni reference for these reasons alone.

Furthermore, claim 1 recites that the vibration damping device includes a piezodynamic damping spacer "configured such vibrations in the bearing are absorbed by the piezodynamic damping spacer and converted to electrical energy" and a "turning system electrically coupled to the piezodynamic damping spacer, the tuning system providing selective control of a resonant frequency of the vibration damping device such that the vibration damping device absorbs vibrations in a selected frequency range". As described in applicants' specification, such a turning system can be implemented to optimize absorption of disturbances in specific frequency ranges. See applicants' specification at paragraph 0034 - 0041 for several detailed examples. In response to applicants' previous arguments, the Examiner alleged that Perni inherently discloses these features, as part of controlling the preload. The Examiner supports this by stating that vibration is proportional to load.

Applicants again disagree, and again note that the claimed limitation is of a tuning system "providing selective control of a **resonant frequency of the vibration damping device**". There is no description in Perni that any resonant frequency is identified, or that it could be selectively controlled.

Thus, applicants submit that independent claim 1 is patentably distinct over the cited Perni reference. Furthermore, as claims 2-13 depend from, and include all the limitations of independent claim 1, they are also submitted to be patentably distinct.

**III. Rejections under 35 U.S.C. § 102 based on Kudo**

Claims 1, 9-15, 17-19 and 21 were rejected under 35 U.S.C. § 102(b) as being anticipated by Kudo et al (U.S. Patent No. 6,286,374), hereinafter "Kudo"). Again, applicants respectfully disagree, and submit that independent claims 1, 14 and 18 are patentably distinct over the cited Kudo reference for several reasons. In the previous response, applicants argued that Kudo failed to disclose a piezodynamic damping spacer is coupled to a bearing in a "momentum control device" as the term is defined in the specification and claims. As with the Perni reference discussed above, the Examiner did not attempt to assert that Kudo teaches a "momentum control device" as claimed. Instead, the Examiner cites a physics text book, and notes that a rigid body is subjected to angular momentum when it rotates about its axis. The Examiner then states that since Kudo's device is for measuring and adjusting preload on bearings, and since it is inherently subjected to angular momentum, that it "reads on" the claimed "momentum device".

Applicants again respectfully disagree, and submit that Kudo fails to teach a momentum control device for similar reasons as given above with respect to Perni. As stated previously, applicants' specification defines momentum control devices as devices commonly used **to impart torque and provide attitude control on spacecraft and other vehicles, with reaction wheels and gyroscopes being two primary examples.** The Kudo device is not a reaction wheel, a control moment gyroscope or any other type of momentum control device. Second, claims 1, 14 and 18 recite that the vibration damping device includes a piezodynamic damping spacer, and a tuning the system coupled to the spacer. Applicants submit that Kudo fails to teach any such a tuning system.

In making the rejection, the Examiner cited column 6, line 18, to column 10, line 35

and claims 1-14 as teaching such a tuning system. Applicants again disagree. While this section describes resonant frequencies, it is generally referring to the resonant frequency of the bearings. **Kudo does not disclose controlling the resonant frequency of the vibration damping device such that vibrations are absorbed**. Thus, it does not describe the use of a turning system to control the resonant frequency of the vibration damping device "such that the vibration damping device absorbs vibrations in a selected frequency range" as recited in claim 1. Nor does it teach the turning system "adjusting the resonant frequency of the vibration damping device such that the vibration damping device efficiently absorbs vibrations in the measured frequency of the vibrations" as recited in claim 14. Finally, it does not teach the tuning system "adjusting the resonant frequency of the vibration damping device such that the vibration damping device efficiently absorbs vibrations created by the momentum control device at the operational speed" as recite in claim 18.

In responding to applicants' previous arguments, the Examiner again alleges that these features are merely inherent results of the limitations of the claims. Applicants again disagree, and note that controlling the **resonant frequency of the vibration damping system** is not the same as controlling vibration in some vague, general sense.

Thus, applicants submit that independent claims 1, 14 and 18 are patentably distinct over the cited Kudo reference. Furthermore, as claims 2-13, 15-17, and 19-21 depend from, and include all the limitations of their respective independent claims, they are also submitted to be patentably distinct.

IV. Conclusion

In view of the foregoing, it is submitted that the Examiner's reliance upon Perni and Kudo do not support rejection of claims and that the above-noted rejections should be withdrawn.

Respectfully submitted,
INGRASSIA FISHER & LORENZ

Dated: September 26, 2006

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